

OAK RIDGE NATIONAL LABORATORY

OPERATED BY

UNION CARBIDE NUCLEAR COMPANY



POST OFFICE BOX X
OAK RIDGE, TENNESSEE

March 24, 1958

TUH

CR

W. G. Bissel, 4-21-58

Director's Files, 1962-63

TVA Folder

Shelf # 59

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Dr. H. M. Roth

Gentlemen:

Subject: Proposed Melton Hill Dam on the Clinch River (Reference:
Letter from C. E. Center to S. R. Sapirie, March 6, 1958)

Since issuing the above letter, our attention is called to a recent revision of the Permissible Levels of Radiation Exposure, transmitted by letter, Sapirie to Center under date of March 6, 1958. The new manual is numbered Instruction OR-0524, Chapter AEC-0524 and is titled as above. These new permissible levels will greatly influence the situation between our Tower Shielding Facility and territory contiguous to Melton Hill Dam, both during the dam construction period and after the dam and power house are placed in operation.

A collimated beam of radiation from the Tower Shielding Reactor will produce an integrated exposure of approximately 25 rems/24-hour day at the inner 600-ft radius barrier. Present operating procedures permit this quantity of radiation to be delivered in a very short time, as for example, fifteen minutes. At the 3000-ft radius barrier the integrated exposure would be 60 millirems/24-hour day. These are the present Reactor Safeguard limits at the 600- and 3000-ft radius barriers. Estimating the distance from the Tower Shielding Facility to the north end of the dam site as approximately 4400 feet, an estimated exposure could be expected of 20 millirems/24-hour day. Based on the limit to civilians, this would permit, for example, maintenance workers in the parking lot twenty-five days per year.

When it is considered that the maximum civilian tolerance is now 6 millirems/24-hour day, or 500 millirems/year, a serious radiation problem will undoubtedly develop with the construction of Melton Hill Dam. This would be the maximum integrated radiation dose at the permanent public parking area that is planned on the shore at the northern end of the dam. If this planned permanent parking area would be located on the shore at the southern end of the dam, the integrated dose reading there would be approximately 10 millirems/24-hour day.

This document has been approved for release
to the public by:

Donald R. Hamm 12/15/95
Technical Information Officer Date
ORNL Site

ChemRisk Document No. 2655

March 24, 1958

Several precautions suggest themselves. To prevent sightseers from approaching too close to the Tower Shielding Facility, the present barbed wire fence at the 3000-ft radius should be replaced with chain link personnel barrier. Some forty telemetering monitoring stations should be installed along the new barrier and at selected locations near the dam. The monitrons should be wire connected to the Tower Shielding Facility control room. It is estimated that the chain link barrier and the monitrons would cost in the neighborhood of \$250,000. If it becomes necessary to reduce the maximum permissible exposure at the 3000-ft fence to 6 millirems/day, the usefulness of the facility would be severely impaired. More time for each experiment would be required, with a resulting increase in the cost of research frequently up to a factor of ten with some experiments being eliminated entirely. Research time is estimated to cost an average of \$1,000 per calendar day.

The Tennessee Valley Authority should be advised that their planning should include the relocation of the permanent public parking area to the south side of the river at the dam. It might be necessary during the construction of the dam that the construction workers be equipped with film badges processed by the Laboratory.

Sincerely yours,

J. A. Swartout
J. A. Swartout
Deputy Director

JAS:FWW:esMc

cc: C. E. Center
E. P. Blizzard
K. Z. Morgan
C. E. Winters
F. W. Wuest

7/1/58 CB

UNION CARBIDE NUCLEAR COMPANY

A DIVISION OF UNION CARBIDE AND CARBON CORPORATION

UCC

POST OFFICE BOX P
OAK RIDGE, TENNESSEE

June 9, 1958

Director's Files, 1962-63
TVA Folder
Shelf # 59

U. S. Atomic Energy Commission
Post Office Box E
Oak Ridge, Tennessee

Attention: Mr. S. R. Sapirie

Gentlemen:

Subject: RELATIONSHIP OF THE PROPOSED MELTON HILL DAM ON THE
CLINCH RIVER AND TOWER SHIELD FACILITY OPERATION

- References: (a) Your letter to me of April 7, 1958, symbol ORA:WJL,
subject: Proposed Melton Hill Dam on the Clinch
River.
- (b) U. S. TVA Map 1:24,000, 1953, Bethel Valley,
Tennessee.
- (c) Letter from H. M. Roth to C. E. Larson, dated November 4, 1954, symbol ORA:WSF, subject:
Operation of TSF Reactor at 500 Kw.
- (d) A classified report, AEC-3430-CVAC, page 24. -
- (e) ORNL-2061, Part IV, ANP Project Quarterly Progress
Report for Period Ending March 10, 1956, page 6. -
- (f) NARF-58-14T, "Airborne Radiation Mapping Data."

Measurements of the radiation dosage leaving the exclusion area have been made at a point on the AEC patrol road where the creek enters the Clinch River near Mile 23 (see reference b). The measurements were made using shielding configuration 5, reference (d), which is the minimum shielding that can be achieved with the ASTR. The ASTR, operating at 1 Mw, was rotated through 180 degrees to insure that the maximum dose rate was being measured. Other measurements were taken along the present AEC patrol road which also indicated that this point was receiving the maximum amount of radiation. It is 4100 ft distant from the reactor at an elevation of 760 ft and allows a line-of-sight to the reactor except for the existing vegetation. All other points on the proposed shore line are at a greater distance or are protected by a hill.

This document has been approved for release
to the public by:

David R. Hammon 12/15/95
Technical Information Officer Date
ORNL Site

June 9, 1958

The measured dose rates at this point were as follows.

Gamma	.55 mrem/hr
Neutron	<u>.78</u> mrem/hr
Total	1.33 mrem/hr

The maximum operating time, using the limit of $24\text{r}/24\text{ hrs}$ at 600 ft imposed by reference (c), is $1\frac{1}{2}\text{ hrs}/24\text{ hrs}$. Therefore, the integrated dose at the 4100-ft point is $2\text{ mrem}/24\text{ hrs}$. Measurements taken at other points along the patrol road and those given in reference (e) indicate that the effect of an intervening hill is to reduce the gamma-ray dose rate to approximately one-half and the neutron dose rate to approximately three-fourths of that measured at the line-of-sight condition. Since this reduction in dose is rather small, particularly in the case of neutrons, it is not considered practical to attempt to use the irregularities in the terrain to minimize the fencing requirements. The dose from the TSR-I operating at 500 kw with minimum shielding will, of course, be $2\text{ mrem}/24\text{ hrs}$ due to the limitations imposed by reference (c), which permits its operation at this power for an estimated .25 hrs/ 24 hrs .

Most of the experiments with the TSR-II will require a highly collimated beam with some shielding in the beam hole. Since the effect of this highly peaked source distribution on dose rates at large distances and in directions other than that of the beam is not known, the effect of dose restrictions at distances of 3,000 and 4,000 ft cannot be evaluated at this time. It is possible, however, to estimate dose rates in the direction that the beam is pointing from the TSR-II on the basis of the measurements given in references (e) and (f) and those just taken with the ASTR. For the purpose of this estimation, a shielding configuration was assumed which is considered to be typical of that required most frequently during operation. This configuration will be such as to be black over 90 per cent of the solid angle seen by the source. The other 10 per cent will, in general, have one to three relaxation lengths of shielding, giving a further reduction of a factor of approximately 10. Table I gives an estimation of the dose rates to be encountered with this configuration in the direction of the beam hole. If operation of the TSR-II is possible for approximately 1,000 hours per year, no particularly deleterious effect will be felt in regard to utilization of the Tower Shield Facility.

TABLE I

ESTIMATED TYPICAL DOSE RATES FROM THE TSR-II AT 5 MW

<u>Distance</u> <u>(ft)</u>	<u>Gamma-Ray</u> <u>Dose Rate</u> <u>(mr/hr)</u>	<u>Fast-Neutron</u> <u>Dose Rate</u> <u>(mrem/hr)</u>	<u>Total Dose Rate</u> <u>(mrem/hr)</u>
600	1,200	14,000	15,200
2,000	20	160	180
3,000	2.5	14	16.5
4,000	0.3	1	1.3

The maximum dose rates which can be achieved from the unshielded reactor at 5 Mw can be obtained by multiplying the neutron dose rates in Table I by 50 and the gamma-ray dose rates by 10, although need for lengthy runs at 5 Mw unshielded are not considered necessary at this time.

The TSR-II will be operated so that personnel constructing and operating the proposed Melton Hill Dam will not receive integrated exposures on a regular shift schedule in excess of .3 rem/quarter, or .5 rem/yr. In general, there are no experimental requirements for pointing the beam in the direction of the proposed dam. The integrated dose will be determined weekly, but may exceed .023 rem/week provided the integration over any quarter does not exceed .3 rem. Suitable monitoring devices will be employed at critical points several thousand feet from the Tower for the guidance of the Tower staff, so these integrated dose limits will not be exceeded.

In view of the above limitations and assuming that the AEC patrol will continue to control public penetration within the controlled area, it is suggested that for the TSR-II a positive personnel barrier be erected approximately 3,000 ft from the Tower in the form of a chain-link fence that can be inspected at reasonable intervals. The integrated dose rate at this fence will then be limited to the Laboratory maximum weekly permissible exposure. Monitors at this fence will determine the over-all operating schedule for the reactor.

Mr. S. R. Sapirie

-4-

June 9, 1958

It is interesting to note the following cost estimates for erecting one mile of various classes of fencing along an existing roadway.

<u>Type of Fence</u>	<u>Cost/Mile*</u>
4-Strand barb wire - steel posts	\$ 3,000
5-Ft hog wire - steel posts	4,000
AEC-type security fence	33,000

* Add \$6,000/mile if fence is erected across country.
Add \$3,300/mile for other than AEC-type security
fence if posts are set in concrete.

The exact location of the fence, particularly in the northward direction from the Tower, will depend on the results of an experiment to be done in mid-July. This experiment will determine accurately the dose levels to be expected at large distances as a function of the angle of emission of the beam. Only after these experiments have been completed will we know the extent to which these limitations will interfere with the TSF program.

Yours very truly,

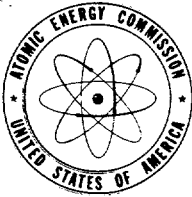
UNION CARBIDE NUCLEAR COMPANY

Clark E. Center

Clark E. Center
Vice President

CEC:WYG:jml

cc: J. A. Swartout (2) ✓
E. P. Blizard
W. Y. Gissel
K. Z. Morgan
H. E. Seagren
C. E. Winters



IN REPLY REFER TO:
ORA:REA

UR TUA ^{0115 R} ^{2/28} ^{sub}
all copies - J.A.Swartout
JAS/7
UNITED STATES
ATOMIC ENERGY COMMISSION
Copies forwarded 1-28-59 by
JAS to:

E. P. Blizard (with enclosure)

Oak Ridge, Tennessee
January 26, 1959

W. Y. Gissel
K. Z. Morgan
J. H. Gillette
C. E. Winters
W. H. Jordan

Director's Files, 1962-63
TVA Folder
Shelf # 59

COPY
FORWARDED BY
C. E. CENTER

Union Carbide Nuclear Company
Post Office Box P
Oak Ridge, Tennessee

Attention: Mr. C. E. Center, Vice President

Subject: PROPOSED PERIMETER FENCE FOR THE OPERATION OF THE TSR-II AT
THE TOWER SHIELDING FACILITY

Gentlemen:

Reference is made to your letter dated June 9, 1958, subject "Relationship of the Proposed Melton Hill Dam on the Clinch River and the Tower Shielding Facility Operation", giving information on the measured and estimated dose rates at various distances from the TSF, and suggestions for building a positive personnel barrier around the TSF area.

We agree with your suggestion that a personnel barrier should be erected at a minimum radius around the TSF area before operations of the TSR-II. An analysis based on data obtained from TSF experiments shows that a perimeter fence at 3,000 ft. affords sufficient personnel protection. The fence should be that necessary to meet the minimum requirements of assuring no inadvertent entrance to the radiation field. We do not believe that a chain link security type fence is necessary due to the low probability of unauthorized penetration into this area at the present time.

In addition to building a perimeter fence at the 3,000 ft. position, we suggest that this same type of fence be extended along the entrance road to the TSF from the 3,000 ft. perimeter fence to the 600 ft. security fence. A fence of this nature along this part of the entrance road to the TSF would prevent inadvertent entrance into the area located between the perimeter fence and the security fence.

This document has been approved for release
to the public by:

Dan R. Hamlin 2/15/95
Technical Information Officer Date
ORNL file


January 26, 1959

We note that if the proposed Melton Hill Dam is built, with a resultant increase in the public's use of the area near the TSF, TVA will build an AEC-type security fence to restrict the public's penetration from the recreational areas into the AEC controlled area. This fence (see enclosed map) will extend from the entrance of the road to the TSF around the south and east sides of the TSF area to the Bethel Valley Road. When this fence is built it will enclose the entire south and east edge of the area concerned and all points along this fence will be more than 3,000 ft. from the TSF.

The action to be taken on the additional fencing for the TSF should be made a part of the Hazards Summary Report for the TSR-II. We recommend that this report be submitted to us as soon as possible since it is estimated to take a minimum of 90 days for consideration by the Hazards Evaluation Staff.

Your cooperation in this matter is appreciated.

Very truly yours,


S. R. Sapirie
Manager
Oak Ridge Operations

Enclosure:
Map of Grid Zone 16

CC: R. C. Armstrong
R. J. Brown
F. P. Trent
F. P. Callaghan
H. M. Roth

Oak Ridge Health Study Document Summary Form

DOCUMENT TITLE:

Proposed Melton Hill Dam on the Clinch River

DOCUMENT NUMBER OR IDENTIFIER: —

AUTHOR(S):

J. A. Swartout
C. C. Center

S. R. Sapirie

PUBLICATION DATE:

3/24/58
6/9/58

1/26/59

DATA TIME PERIOD: Start

1958

Stop 1959

LOCATION OF COPY (if one was made):

ALA

CLASSIFICATION CATEGORY: UNK UNC OUC UCNI CL* *Category & Level: FRD or RD or NSI; CONF or S or TSSITE(S) DOCUMENT ADDRESSES: K X Y S ORR MELT CLIN WOC WOL POPL EFPC PCE BEAR WATT

SOURCE/LOCATION OF DOCUMENT:

Director's Files 1962-63: TVA Folder

DOCUMENT CATEGORY

X-10 ~~DOE~~ DF -AI [DL dr dc da] ED ea ew es ef] EP [HO hp hr hs hw] IN IP [ST sa sw ss] TM WP

Primary category - circle once; Secondary category (optional) - circle twice. Circle only one in a bracketed group.

DATE ENTERED INTO DATABASE:

BY:

InMagic No.

KEYWORDS:

Tower shielding Facility
radiation

Melton Hill Dam

ABSTRACT:

Discussion of potential exposure to radiation from the Tower Shielding Reactor at the location of the new Melton Hill Dam, both during the dam construction period and after the dam and power house are placed in operation. Recommends relocation of the public parking area to the other side of the river, and building of a perimeter fence.

REVIEWER: GM Bruce

DATE REVIEWED: 2/18/96